

REMARKS

Applicants have amended claims 1-3, 19-21, 33-35, 37-39, 46-48, 50-55, and 57-59 to differently recited the invention, and have canceled claims 4, 10, 14, 18, 36, 49, and 56, without prejudice or disclaimer. Accordingly, claims 1-3, 5, 7-9, 11-13, 15-17, 19-35, 37-48, 50-55, and 57-59 are currently pending for consideration. Of these, claims 23-32, 40, and 41 are withdrawn.

In the pending Office Action, the Examiner rejected claim 1 (and perhaps claims 3-4, 19, and 21-22 also) on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-38 of U.S. Patent No. 6,992,026 (hereinafter "the '026 patent") in view of Umehara et al. (U.S. Patent No. 5,882,956, hereinafter "Umehara"); objected to claim 36 because of informalities; rejected claims 1, 3-5, 7, 9-15, 17-19, 21-22, 33, 35-37, 39, 42-46, 48-50, 52-53, 55-57, and 59 under 35 U.S.C. § 103(a) as being unpatentable over Hoekstra (U.S. Patent No. 6,420,678, hereinafter "Hoekstra") in view of Umehara; and rejected claims 2, 8, 16, 20, 34, 38, 47, 51, 54, and 58 under 35 U.S.C. § 103(a) as being unpatentable over Hoekstra in view of Umehara, and further in view of Piwczyk (U.S. Patent No. 6,376,797, hereinafter "Piwczyk"). Applicants respectfully traverse each of these objection and rejections, at least for the following reasons.

Claim 36 has been canceled without prejudice or disclaimer. Accordingly, reconsideration and withdrawal of the objection to claim 36 are respectfully requested. The other issues asserted by the Examiner in the pending Office Action will now be addressed.

As background, and in accordance with embodiments of the present invention, a semiconductor substrate and associated die-bonding resin layer are provided. Laser irradiation is performed in order to form a modified region within the semiconductor substrate. Then, the

sheet with which the semiconductor substrate and die-bonding resin layer are associated is expanded. The expansion of the sheet simultaneously pulls apart the semiconductor substrate and the die-bonding resin layer. More particularly, as is now recited in each of the independent claims, the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet. By this process, the semiconductor wafer and the die-bonding resin layer are separated at the same time. This allows processing efficiencies and quality improvements that are neither taught nor suggested by any of the applied references, whether viewed alone or taken in combination.

By way of example only, and not in any way limiting the scope of the present claims or the invention, Applicants now make reference to one or more examples disclosed in the present specification. In doing so, and for the sake of convenience, Applicants refer to the paragraph numbers and drawings as reflected in the published version of the instant application, namely, U.S. Published Patent Application No. 2006/0148212 published on July 6, 2006. With reference to paragraphs [0116] – [0118] of this document, and its Figs. 16-18, there is shown a silicon wafer or substrate 11, a die-bonding resin layer 23, and adhesive sheet 20. Fig. 16A shows the state where the die-bonding resin has not been cut yet. Then, as the adhesive sheet 20 is expanded, the die-bonding resin layer 23 is torn apart so as to be cut along the part which is intended to be cut 9 as shown in Fig. 16B. As can be understood from paragraph [0017], when the expanding of the adhesive sheet 20 is completed as such, the die-bonding resin layer 23 is cut into the individual semiconductor chips as shown in Fig. 17A. As can be further understood from paragraph [0018], when made of nonelastic material, for example, the die-bonding resin

layer 23 is not left on the base 21 of the adhesive sheet between the semiconductor chips 25, 25 separated from each other as shown in that figure.

Advantages of this type of process are discussed throughout the instant specification. As stated in the Abstract of the instant application, for example, via the aforementioned type of process, “the silicon wafer 11 and die-bonding resin layer 23 can be cut much more efficiently than in the case where the silicon wafer 11 and die-bonding resin layer 23 are cut with a blade without cutting a base 21.” Thus, the present invention was designed specifically to avoid having to perform processes of the type used in the references applied in the pending Office Action (e.g., Umehara).

Against this backdrop, Applicants traverse the obviousness-type double patenting rejection based on claims 1-38 of U.S. Patent No. 6,992,026 (hereinafter “the ‘026 patent”) in view of Umehara, at least because neither of these references disclose or render obvious any of Applicants’ claimed combinations wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet. In this regard, claims 1-38 of the ‘026 patent are completely silent as to this feature, and Umehara, as apparently recognized by the Examiner, merely uses blade type cutting of the kind discouraged in the Abstract and throughout the remainder of the instant application. Moreover, because these references do not disclose or render obvious the “torn apart” aspect of the present invention, they also do not disclose or render obvious combinations such as recited in Applicants’ claims 50-55 and 57-59 wherein the sheet is expanded by pulling peripheral portions of the sheet outwardly. Accordingly, reconsideration and withdrawal of the obviousness-type double patenting rejection based on claims 1-38 of and Umehara, are respectfully requested.

Applicants submit that the rejection of claims 1, 3-5, 7, 9-15, 17-19, 21-22, 33, 35-37, 39, 42-46, 48-50, and 52-53 based on Hoekstra and Umehara, and the rejection of claims 2, 8, 16, 20, 34, 38, 47, 51, 54, and 58 based on Hoekstra, Umehara, and Piwczyk, are similarly deficient.

In Hoekstra, for example, there is no simultaneous tearing apart of a semiconductor substrate and die-bonding resin layer. Instead, as described in Hoekstra at col. 6: 37-51, for example, and as shown in Fig. 5, a splitting device 20 is moved relative to substrate 4 so that (a) a scribe beam 42 heats the substrate 4, from the initial microcrack formed by the scribe initiation device 24, along the separation line 45, (b) a quenching stream 44 removes the heat from the substrate 4 along the separation line 45, thereby thermally shocking the substrate 4 in that region and propagating the microcrack along the separation line 45, and (c), the break beams 46 and 48 heat the regions on both sides of the microcrack to create tensile forces that are sufficient to separate the substrate 4 along the separation line 45 from the microcrack to the bottom surface.

Thus, in Hoekstra, in cutting of any object to be processed, rapid heating and rapid cooling of a surface of the object are indispensable steps and, even if any cutting of the object were performed by such rapid heating/rapid cooling, Hoekstra still does not disclose or render obvious the tearing apart of a die-bonding resin layer by expansion of a sheet on to which the wafer is attached through the die-bonding resin. Nor does Hoekstra disclose or render obvious combinations such as recited in Applicants' claims 50-55 and 57-59 wherein the sheet is expanded by pulling peripheral portions of the sheet outwardly, for essentially the same reason.

Applicants submit that neither Umehara nor Piwczyk makes up for these deficiencies in Hoekstra. As alluded to above, Umehara merely discloses that a die-bonding resin layer may be cut by a blade. However, such cutting was already considered and specifically avoided by

Applicants' specification, as can be understood from the final sentence of Applicants' Abstract, for example. Consequently, it is clear that Umehara does not disclose nor render obvious tearing apart the die-bonding resin layer by expansion of a sheet on which the wafer is attached through the die-bonding resin layer, or expanding the sheet by pulling peripheral portions of the sheet outwardly, for that matter. And neither does Piwczyk.

Moreover, Applicants submit that references such Hoekstra, which focuses a laser, and Umehara, which utilizes a blade, are not properly combinable. Further, even if the applied references were to be combined in the manner asserted in the Office Action, Applicants submit that the resulting combination would not include the basic feature of Applicants' invention, namely, tearing apart the die-bonding resin layer along with the semiconductor substrate by expanding the sheet. Among other things, neither Hoekstra nor Umehara pulls or expands any sheet. Instead, for example, Hoekstra opts for the process of applying thermal stress.

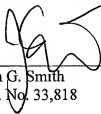
For at least the foregoing reasons, Applicants respectfully request that the applied references of record do not disclose or render obvious the combinations recited in Applicants' claims, whether such references are viewed alone or in combination. Accordingly, reconsideration and withdrawal of the pending rejections are respectfully requests, and a prompt and favorable action is earnestly solicited.

CONCLUSION

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited. **EXCEPT** for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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